Remarks

ON THE

EARLY SYMPTOMS OF MENTAL DISORDER.

READ BEFORE THE LAMBETH DIVISION OF THE BRITISH MEDICAL ASSOCIATION.

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MR. CHAIRMAN AND GENTLEMEN,—I have thought that the subject which I have chosen would be of greater interest to you than any other because the *early* symptoms of mental disorder are those which occur in your own practice. The early symptoms have usually passed off before the patient is brought to the notice of a consulting physician. Yet it is important that mental disorder should be recognized in its early stages, so that treatment may be adopted with a view to cutting short the disease, if possible, and sparing the patient the stigma of certification and confinement in an asylum for the insane.

Consciousness, mentation, or whatever you like to call mind, is the faculty or function by which we become aware of our surroundings; and it is obvious that we can only become aware of our surroundings by means of sensations aroused by them. A man in whom no sensations can be aroused is unconscious, he has no consciousness; and *vice versa*, a conscious individual is constantly experiencing sensations.

DISORDERS OF SENSATION.

Disorder of sensation is a very common symptom of mental disorder; it is either excessive (hyperaesthesia) or deficient (anaesthesia). Hyperaesthesia occurs most frequently in maniacal states. If a patient suffering from acute mania be lightly touched with the point of a pin, he screams. His hearing is also more acute than usual; one such patient heard every word of a conversation between a nurse and myself at a distance of forty yards; another complained of the ringing of church bells, which I could only just hear by a strain of attention, and which his attendant could not hear at all. In these cases hyperaesthesia was a well-marked symptom; and it is to be inferred from them that slight general hyperaesthesia is sometimes to be regarded as an early symptom of mental disorder.

Anaesthesia occurs more frequently than hyperaesthesia. It is most commonly found as an early symptom in states of exhaustion, following acute fevers and prolonged mental anxiety or worry; and it is especially to be looked for in the hands, more particularly on the backs of the fingers. This anaesthesia may also be detected in some early cases of dementia praecox and in many cases of stupor. In the early stages there is no loss of *tactile* sensation; but if you prick the patient's hand with a pin and gradually travel up the forearm you will find that there is a definite line on the forearm, below which he does not experience pain on being pricked.

DISORDERS OF PERCEPTION.

Perception may be defined as the process by which various sensations combine with our memory images of previous experience in such a way as to lead us to cognize objects in our environment. If there is a cigar lying on the table and I look at it and see that it is a cigar, that is a process of perception—I have perceived a cigar.

There are three main disorders of this process—namely, illusion, hallucination, and imperception.

When there is a pencil on the table and I perceive it as a cigar, I experience an illusion. When there is nothing on the table and I see a cigar lying there, I experience an hallucination; and when a cigar lies on the table and I cannot tell what it is, I suffer from imperception.

Each of these disorders might form the subject of a separate paper; I can now touch upon them but briefly.

Perhaps the most common condition in which patients experience illusions is the delirium of fever. The pattern on the wall-paper shapes itself into grinning faces peering at the patient. A knock at the door is mistaken for the booming of cannon, the doctor is mistaken for the patient's father, and the nurse is an enemy in disguise.

Hallucinations are more frequent than illusions. They may affect any of the senses, and they are classified according to the sense which is affected. There are hallucinations of vision, hallucinations of hearing, hallucinations of smell, taste, and cutaneous sensation, hallucinations of static sense, of the muscular sense, and so forth.

Hallucinations of vision usually take the form of faces or flashes of light. Hallucinations of hearing are usually voices—especially the voices of unseen enemies. The most common hallucination of smell is probably the odour of decomposing animal matter or perhaps of something burning. It has been said that this is especially the case with women suffering from physical disease of the genital system.

But I believe the most common hallucination of all is one not referred to the special senses but to the abdomen. I refer to the so-called epigastric sensation. At Bethlem Hospital I once took a census with regard to the frequency of this sensation, and I found that 63 out of 240 patients suffered, or had suffered from such an hallucination, and of the remainder about 25 were unable to make reliable statements about the matter. Cases were excluded in which the sensation was due to indigestion or to constipation. The epigastric sensation is usually described by the patient as a sinking feeling about the epigastrium, but it may be a feeling of fullness or even of pain.

Such sensations occur not always in the epigastrium, but sometimes in the umbilical region, in the hypogastrium, or even in the external genitalia. They are occasionally referred to the chest (sternal region), and probably such symptoms as "globus hystericus," "neurotic spine," "hysteric hip," and "hysteric shoulder" are of the same nature.

I have demonstrated, I believe satisfactorily, that these sensations are due to slight anaesthesia of the limbs allowing the abdominal region to usurp consciousness. I have dwelt on them at some length because I believe that their recognition would be of great importance to the general practitioner. I know that many of these cases even in asylums, are erroneously treated for indigestion, and I believe that a large number of cases of supposed indigestion in general practice are in reality of this nature, and should be treated not for indigestion but for a neurosis.

The third disorder of perception—namely, imperception—is most commonly met with (apart from organic brain disease) in the insanities due to alcohol and arteriosclerosis. It also occurs in slighter degree in the insanity of exhaustion following acute physical illness, and in one form of dementia praecox.

I am still dealing with purely mental symptoms, which do not of necessity force themselves upon your notice—symptoms, in fact, which have to be looked for specially by an examination of the patient.

Some of Dean's rag toy-books for children, which I will pass round, form part of my armamentarium. With these books I examine for imperception by covering the name of some object represented therein and asking the patient what the object is. If he cannot recognize it correctly he is suffering from imperception. In the domain of hearing you may test the patient by telling him, in a monotone and without gesture, to perform some simple act. Suppose, for example, you say to him: "Put your left hand on your head," and he fails to grasp at once the meaning of such a simple sentence, he is suffering from imperception. Similarly, these patients are unable to recognize familiar odours, such as peppermint and cloves. It has further been demonstrated that they suffer (quite early) from a form of colour blindness—not the ordinary colour blindness, in which green and red cannot be distinguished from one another, but a form in which green and blue cannot be distinguished, and they invariably pick out the confusion colours from a batch of Holmgren's wools.

For the detection of slighter degrees of imperception I use another picture book for children. It is entitled *Proverbs Old Newly Told*. You will observe that I have effaced the proverb under those pictures which tell their tale well, and that you are able to recognize the proverb from the picture. When a patient cannot do this, he is suffering from a slight degree of imperception. These slight degrees of imperception are most frequently met with in early arteriopathic cases.

IMPERATIVE IDEAS.

The only disorder of ideation to which I will refer is the imperative idea, the idea which cannot be driven from the mind. The simplest examples of this mental state are tunes running in the head. Mark Twain has made another instance classical, namely:

Punch, conductor, punch with care,
Punch in the presence of the passengars.

A form slightly more advanced than this is the imperative idea that one has placed letters in the wrong envelopes. One opens them and finds that they are all right. But again the idea occurs that in placing the letters back in their new envelopes one might not have been sufficiently careful. The idea haunts you, and you give way to it and open the envelopes again. This may occur several times more without crossing the border-line between sanity and insanity; but if it recurs so frequently that the letters never get posted, the border-line is crossed, and we have a case of obsessional insanity.

I once knew a curate who suffered from this form of insanity. Here is one of his obsessions: He would get the absurd idea that he had accidentally pushed some one into the inkpot. He knew and realized the absurdity and impossibility of such an occurrence, and for a time would resist the impulse to look into the inkpot and see if there was any one there; but no relief came until he had done so, and he could not get on with his work until he had satisfied himself on the matter. He would look into the inkpot, see that there was nobody there, and was then, and not till then, able to resume his occupation.

DISORDERS OF MEMORY.

There are three disorders of memory to watch for, namely, amnesia, or loss of memory; hypermnnesia, or excess of memory; and paramnesia, or erroneous memory. Let us consider these three disorders of memory in detail.

Loss of memory is a frequent symptom of many forms of mental disorder. Memory follows the ordinary rule of dissolution in that the most recently-acquired memories are the first to go. If you wish to test a man's memory do not ask him to relate incidents of his youth, but ask him what he has had for breakfast that morning, and verify his answer by asking some more reliable person whether his statements about the matter are correct. Another very good test which I am in the habit of using is to ask the patient the time when he has not seen a clock for an hour or so; a normal person is remarkably accurate in such estimation of time. It may be taken as a general rule that things are forgotten before actions, and ideas of things before ideas of actions. In the domain of language, the first words to be forgotten are proper names, then common nouns. The man cannot remember the names of his friends, and fails to recall the names of unfamiliar objects.

Hypermnnesia, or excessive memory, occurs most frequently in certain cases of idiocy and in some cases of chronic mania. The term explains itself. A patient with this symptom is able to write out from memory a diary of his doings in previous years. In some cases he is also able to give a detailed account of the doings of others. One such patient at Prestwich could enumerate all the occasions when any given medical officer had played tennis since he entered the institution. I merely mention this symptom for the sake of completeness. It is usually in advanced cases that it is a striking symptom; but we may assume that it has its early beginnings in which the hypermnnesia is less marked.

Paramnesia is a condition in which the patient remembers situations and incidents which have never occurred. It is almost limited to a form of alcoholism associated with peripheral neuritis, which is known as Korsakoff's disease.

There are two main varieties of paramnesia, which I prefer to call respectively illusions of memory and illusions of recognition. A bed-ridden patient suffering from illusions of memory will tell you that he has been out for a long walk in the park that morning. He believes this, and will recount numerous incidents which he supposes to have occurred in the course of the walk.

A patient suffering from illusions of recognition will tell you when he enters a nursing home, in which he has never been before, that he recognises the place, from some previous experience. This condition is not limited to the

insane: many popular authors write of having experienced it. Such a person enters a village, where he cannot possibly have been before, and at once experiences a feeling of recognition—feels that he has been there before. This phenomenon has given rise to the absurd idea of pre-existence.

DISORDERS OF CONDUCT.

All the symptoms we have so far considered are purely mental. By this I mean that they are experienced by the patient himself and by nobody else. An onlooker can know nothing of them unless the patient tells him about them, or unless they are elicited by a careful and often skilled examination.

I now come to the consideration of changes in the patient's conduct, which force themselves upon the notice of the most superficial observer.

It is possible that a stone may experience sensation, perception, ideation, and memory; it may even experience illusions and hallucinations, but in the absence of movement by which it might adapt itself to its environment we have no evidence that a stone has any mentation. Movement of some kind is the only external evidence of mentation, and disturbances of conduct are the only real external evidence of *disordered* mentation.

INSTINCT VERSUS VOLITION.

It has hitherto been supposed that all movements associated with mentation take place through the medium of the pyramidal tracts; but I have pointed out that a very large number of movements take place through the medium of what I have called the cortico-rubro-spinal system. In other words there are two cortical motor tracts instead of one as has hitherto been supposed.

With the pyramidal tract you are all familiar; it subserves the function of voluntary and automatic acts. The cortico-rubro-spinal system consists of two sets of neurons, an upper set passing from all parts of the cortex to the red nucleus and a lower set passing from the red nucleus to the large motor cells in the anterior cornua of the cord. This system, as I have shown, subserves the function of emotional reaction and instinctive movement. Of these two motor systems the pyramidal is the more unstable. Under normal conditions, a person's pyramidal system has control of or has the power of inhibiting the activities of the cortico-rubro-spinal system. In other words, a normal person can volitionally, by means of will, control his instincts and emotions; but when degeneration takes place, he loses control of his instincts and emotions. He weeps or laughs inordinately at the most trivial incidents.

Loss of control of the instincts is an exceedingly interesting symptom to study; and it is to be observed that in mental dissolution the various instincts become dominant in the reverse order of their evolution. I cannot here enter into the whole question of the development of the instincts; but I would like to remind you that instincts develop in the child in the following order, to take a few examples:

Sucking, crying, grasping objects placed in the hand, smiling, handling objects and carrying them to the mouth, imitating sounds, sitting up, standing, walking, curiosity, inquisitiveness, cleanliness, destructiveness and constructiveness, emulation and rivalry. All these are instincts which develop before the tenth year, and I will not refer to them again; but I wish to direct your attention to the instincts which develop after this age.

The instinct to make collections of some sort of thing usually shows itself, at least in boys, about the tenth year. The instinct to eat, which develops at a very early age, becomes especially prominent from 10 years of age up to puberty. At this age the boy eats everything that is placed before him; there seems to be no possibility of satisfying his appetite, and he takes the greatest interest in the confectioner's shop.

The period between 12 and 15 is characterized by well-marked boastfulness and conceit. This generally develops into a feeling of power, general *bien-être*, and, if it is not soon under volitional control, a state of *simple mania*.

The sexual instinct appears shortly afterwards. Then follow the instincts of hunting, fishing, and shooting, stronger in man than in woman, for it is the man's natural duty to provide food for his family. In large towns these last instincts usually find an outlet in open-air games. Perhaps the last instinct to develop is the desire to spend money.

Now, in the various forms of mental dissolution, the first motor system to be affected is the volitional, the pyramidal system which is myelinated at least sixteen months after the instinctive cortico-rubro-spinal system. The first symptom of mental disorder is loss of voluntary control of the instincts. The pyramidal system is unable to control the cortico-rubral. Accordingly, we find in the lightest grades of mental disorder that the patient has insufficient control of those instincts which were latest developed. The man is unable to maintain interest in his everyday routine occupation; he spends money recklessly, and he must be out-of-doors playing games. A latter-day exemplification of the out-of-door instinct is motoring. Motoring all day and every day is not uncommonly the first symptom of general paralysis. When dissolution is slightly more advanced he is a sexual libertine. Boastfulness, conceit, and a general sense of *bien-être* once more becomes prominent.

The eating instinct next gets out of hand, and the general paralytic bolts whole slices of meat without waiting to cut them up. This is so well recognized that all the general paralytics in establishments for the insane are fed on mince.

As dissolution proceeds, the collecting instinct once more becomes prominent. The general paralytic orders fifty watches, twenty pianos, and a dozen motor cars. At this stage the relatives commonly realize the true state of affairs, and the patient is sent to an asylum, where he takes to collecting rubbish. About a year ago I noticed in the daily paper an account of a man who had been in this state of dissolution for years; his house was so full of old newspapers that only a narrow gangway was left between the heaps in each room.

All these symptoms may be observed by a medical man without his being specially called in to examine his patient. The patient's friends fail to recognize that he is suffering from mental disorder, and I take it that it is the duty of a general practitioner, under such circumstances, to call upon his patient's friends and to give them his opinion without having been asked for it. It frequently happens that the widow of a general paralytic is left almost penniless, when she might have been left in fairly affluent circumstances, had her medical man called, informed her of the nature of her husband's malady and advised her how to put an end to his extravagances. You may always be sure that there is a great deal more going on behind the scenes than you are aware of.

DISORDERS OF EMOTION.

I now proceed to consider some disorders of emotion, for emotion and instincts are but different aspects of the same mental process. I have recently shown that the cortico-rubro-spinal system also plays an important rôle in connexion with the motor manifestations of the emotions, but I will not trouble you with the pathology of these conditions.

Excitement and depression out of proportion to the circumstances in which an individual is placed are common among the early symptoms of mental disorder. They may, of course, be easily recognized if a patient tells you how he feels; but how are you to recognize this abnormal excitement and depression when the patient says nothing to give you a clue? I know of no better method than that of noticing how your patients shake hands.

Most people shake hands from the elbow; but when a patient becomes unduly exalted or excited, he holds his head erect and shakes hands from the shoulder. When, on the other hand, he becomes unduly depressed, he droops his head and shakes hands from the wrist. These are frequently the early cases of mania and melancholia which many physicians, unfamiliar with mental disease, erroneously call borderland cases. Eccentrics, mattoide, and cranks are the true borderland cases.

More often, however, one finds that mania is called hysteria, and melancholia is called neurasthenia. Out of consideration for the patient and his friends, one would have no objection to the use of these euphemistic terms were it not that they frequently lead to erroneous treatment—treatment which, in the case of melancholia, too often leads to suicide.

Before leaving the subject of the hand-shake let me tell you about the hand-shake of dementia praecox. When a patient suffering from this disease shakes hands he

usually extends all the digits, holds the hand stiffly, and pushes the tips of his fingers towards you. Then in many cases he pulls the hand away again before the hand-shake is over.

Of other disorders of the emotions, unjustified suspicion is the most important; it occurs in the early stages of paranoia and dementia paranoides. As may be supposed, it is a symptom which is usually concealed by the patient. The best physical sign of suspicion which I can give you is a peculiar restlessness of the eyes; the patient, during the course of a conversation, allows his gaze to dart from one point of your face to another two or three times a second. I have thought that this is the relic of an ancestral movement of the eyes in search for anticipated danger.

I am particularly anxious for the early recognition of paranoia for two reasons: One is that paranoia is regarded as an incurable disease; but, on the other hand, it is rarely recognized before it has become established, and therefore does not come under special care for some years after the onset. The earliest symptoms in most of my cases occurred five or six years before they came under my observation. The shortest history of a case of paranoia which I have encountered was of two and a half years' duration. What I am anxious to know is whether it is possible to arrest the course of this disease by correcting the patient's suspicious habit of thought in the early stages. The other reason for the early recognition of paranoia is that the disease is responsible for a large number of murders.

Morbid fears are not very common, but they are fairly well known to the general practitioner. I need only mention a few examples to remind you of the class of case to which I refer. Agoraphobia is a dread of open spaces. Claustrophobia is a fear of closed spaces and closed doors. Mysophobia is an insane dread of dirt or sometimes of vermin, microbes, etc. Acrophobia is a fear of heights, and so on *ad infinitum*.

Loss of control of emotional reaction in general is an early symptom of loss of will power. It occurs most typically in general paralysis, chronic alcoholism, and slight maniacal conditions. Such patients laugh or weep on the most trivial provocation, frequently for no apparent reason whatever.

On the other hand, loss of emotional reaction, or apathy, is commonly an early symptom of melancholia or dementia praecox, the difference between the two conditions being that a patient suffering from dementia praecox does not realize that he is apathetic, whereas a melancholiac is painfully conscious of this symptom. If you tell a melancholiac a good joke he does not laugh; if you tell him that his dearest friend or relative is dead, he only tells you that he does not seem to feel it. He realizes that his emotions are dead.

A still earlier symptom of melancholia and some other forms of mental disorder is loss of interest in routine work and inability to keep the attention fixed upon the object in hand. There is consequently an incapacity for routine work but not necessarily for all work. The moral imbecile, for example, will play games, paint pictures, write poetry, and perhaps play some musical instrument; in fact, he is a jack-of-all-trades, but he is incapable of the plod, plod, plod, which is necessary to success in his life's work.

DELUSIONS.

Delusions scarcely come under the heading of early symptoms of mental disorder, but it is desirable that they should be recognized as early as possible. Failure to recognize delusions generally arises from the patient convincing his medical man of the truth of his statements.

In the absence of further evidence, who could deny a man's statement that he has led a wicked life? A man who worries about his past misdeeds may, however, be suspected of mental disorder *a priori*, for most renegades are utterly callous about the matter. Again, in the absence of a man's bankbook, who can deny that he has come in for two thousand a year, or that he is ruined? And yet again, when a patient complains to his medical man that his bowels never act, it is not unnatural that he should be treated in the first instance for constipation, and not for mental disorder.

Many such delusions would be detected, however, earlier than they are if practitioners would allow the

possibility of mental disorder to cross their mind more frequently.

INSOMNIA.

Lastly, let me mention the most common warning note of all, namely, sleeplessness. Loss of sleep is undoubtedly a mental disorder, should be treated as such, and should ever keep the medical man on the alert for some of the other symptoms to which I have referred in this paper.

Before leaving my subject, let me once more attempt to dispel any idea that it is the wish of those members of our profession who, like myself, have devoted their attention to the study of mental disease, to see the greater part of the population gathered into asylums for the insane. The main object which I have throughout had in view during the preparation of this paper is the importance of an early recognition of mental disorder, so that patients may be treated as far as possible in their own homes, and spared the stigma of certification and compulsory treatment in an asylum for the insane.

VICIOUS CIRCLES.*

By JAMIESON B. HURRY, M.A., M.D.,

READING.

THE term "vicious circle" (*circulus vitiosus*) denotes a morbid condition in which cause and effect are so correlated that cause becomes effect, and effect becomes cause. *Ablata causa cessat effectus* and *ablato effectu cessat causa*.

Many such circles are met with in disease, as indeed might be expected from the complexity of the processes involved; the better those processes are understood, the more closely will they be found correlated, and the more often will reciprocal relations be observed.

The study of vicious circles is of considerable clinical value as contributing to accuracy in diagnosis and prognosis. Moreover, it assists treatment by directing attention to disease in its widest aspects (that is, to both its immediate and remote manifestations), and to the importance of cutting any link in the chain of morbid processes.

PHYSIOLOGICAL CIRCLES.

By way of introduction some examples of physiological or healthy circles always operative in the body may be mentioned; from these examples it will be seen how frequently morbid processes are but exaggerations of physiological ones.

1. The processes of haemogenesis and haemolysis, by which the adjustment between the birth and destruction of blood corpuscles is effected, furnish an example of a healthy circle. The regulating apparatus is probably of the nature of a chemiotaxis, although this is still doubtful. At all events, a physiological polycythaemia or oligocythaemia is brought about according to requirements; inadequate compensation may give rise to a vicious circle.

2. Another example is found in the mechanism of respiration, where a reciprocal relation exists between the condition of the blood and the activity of the respiratory centre. That activity, as has recently been proved, is augmented if the tension of carbonic dioxide in the blood increases, and depressed as that tension falls. The carbonic dioxide acts as the hormone or chemical messenger.

3. The relation of the heart's beat to blood pressure is another illustration of a physiological circle, the rate of the beat being in inverse ratio to the vasomotor constriction. In other words, a rise of pressure diminishes while a fall of pressure increases the rate of the pulse, the adjustment being effected through the intervention of the central nervous system. In this way the arterial tone is maintained.

Two physiological circles associated with vision are of interest here, owing to their connexion with vicious circles.

4. The first is the relation between the size of the pupil and the amount of light falling on the retina. The brighter the light the greater the contraction of the iris; the greater the contraction, the fewer the rays of light transmitted.

5. The other example relates to the intraocular tension,

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which is governed by a self-regulating mechanism. In the main the tension depends on the arterial pressure. If, however, that pressure is abnormally raised, the outflow of the fluids of the eye through the lymph channels is so increased that the pressure is again reduced to a normal level. Conversely, if the intraocular pressure is diminished (for example, after an escape of aqueous fluid), more blood enters the ciliary body, and more fluid transudes into the eyeball, while less escapes. Such is the automatic mechanism by which the normal pressure is maintained.

6. A different form of healthy circle is met with in the case of an active-minded person, whose brain increases in size as a result of the intellectual activity, which growth leads in turn to further activity; and, again (7), during convalescence, where return of strength in the various organs invigorates the others, the assistance given being mutual.

VICIOUS CIRCLES.

So varied is the pathology of vicious circles that some classification is necessary for closer study. The following grouping, based on etiology, will be found convenient:

Group I.—Organic Circles.

This group includes circles arising between two organs so interdependent that when the first is diseased and in difficulty, the second, becoming in turn affected, upsets the first, and vice versa.

An example of such a circle is frequently met with in acute pneumonia, the lungs and the heart being the organs reciprocally involved. Dilatation and consequent failure of the heart constitutes one of the chief dangers of pneumonia, due to the unusual effort needed to overcome the increased obstruction in the pulmonary circuit. This failure reacts unfavourably on the lungs by retarding the circulation through them, and as a result further work is thrown on the heart, whose nutrition is impaired and whose muscular power is already unequal to the demands made upon it. Thus heart and lungs reciprocally embarrass each other, and the vicious circle explains the fatal issue of many attacks of pneumonia. A similar relation may occur between the heart and the bronchial tubes in acute bronchitis. Emphysema and bronchitis supply another illustration of an organic vicious circle, as has been pointed out by West.¹

Though emphysema is commonly the result of bronchitis, still it also in turn leads to bronchitis, for the wasting of the alveoli and consequent destruction of vessels leads to obstruction to the circulation through the lungs, and, in the end, to dilatation of the right heart and systemic veins, and thus to congestion of the bronchi.

An example of an organic circle between the heart and liver, given by Mitchell Bruce,² is interesting as illustrating the vicarious assistance rendered to each other by the organs concerned:

When the wall of the heart fails, the liver affords it temporary relief . . . by accommodating mechanically within it the blood that otherwise would have over-burdened the cardiac chambers. But the hepatic functions, and in their turn the stomach and bowels, which are dependent on the portal circulation, presently become deranged; and thereupon the heart is further weakened, and it may be finally undone by a set of conditions created by itself, and for its own immediate temporary advantage. The heart has paid dear for the accommodation. The day of reckoning has come. Bad has led to worse. A vicious circle is established—the penalty attending the accommodating process and the vicarious action by which one organ relieves another in distress.

This example also shows how a circle gradually widens. Primarily the heart and liver are alone involved; but the mischief spreads, and may extend to the systemic and portal systems and involve such remote organs as the kidneys and the brain.

In cases of aortic regurgitation a vicious circle may arise through the insufficient filling of the coronary arteries. Hence follow imperfect nutrition of the myocardium, weaker heart-beats, increased regurgitation, and a still less adequate repletion of the coronaries, culminating in the sudden death caused by aortic regurgitation.

In another circle of less gravity the liver and stomach are the interdependent organs. Gastric catarrh leads to portal congestion, and this, again, reacts on the catarrh. The first disorder causes the second; the second in turn causes the first. Indeed, such reciprocal relations